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**De Wind et al.**

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(54) **FRAMELESS INTERIOR REARVIEW MIRROR ASSEMBLY**

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(58) **Field of Classification Search**
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,962,933 A 12/1960 Hezler, Jr.
3,280,701 A 10/1966 Donnelly et al.
(Continued)

FOREIGN PATENT DOCUMENTS

DE 2254511 5/1971
DE 3049169 7/1982
(Continued)

OTHER PUBLICATIONS

International Search Report and Written Opinion dated Jun. 21, 2010 for corresponding PCT Application No. PCT/US2010/032017.
(Continued)

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(57) **ABSTRACT**

An interior rearview mirror assembly for a vehicle includes a mirror casing and a prismatic interior reflective element. The reflective element comprises a wedge-shaped glass substrate having a perimeter edge about a periphery of the glass substrate and extending between first and second surfaces thereof. The glass substrate has a mirror reflector established at the second surface. A front surface of the perimeter edge provides a smooth curved transition at the perimeter edge between a perimeter region of the first surface and the mirror casing. The front surface of the perimeter edge is rounded by at least one of grinding and polishing to provide a generally rounded curved surface between the first surface of the glass substrate and the mirror casing. The radius of curvature of the front surface is at least about 2.5 mm. No portion of the mirror casing encompasses the first surface of the glass substrate.

**14 Claims, 31 Drawing Sheets**